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To Mr. F.J. Kee
Director of Research

TORONTO WEATHER DATA

F.S. Porfido

Historic Fahrenheit temperature data for Toronto has been re-worked to provide monthly basic data tables in Celsius degrees and Celsius degree-hours for 1 and 3 degree bin widths and a variety of reference temperatures. The general impact of high insulating levels on the monthly heating requirements of a dwelling are shown.

Introduction

The Atmospheric Environment Service publishes an Hourly Data Summary, HDS-3R, reporting the frequency of occurrence of various atmospheric conditions. Unfortunately, past records (1953-76) are only available in Fahrenheit; hence, an algorithm is required to convert the temperatures to Celsius (see Appendix). The tables in this report present the historical weather data and provide heating degree-day bin data in Celsius.

Temperature Frequency Data

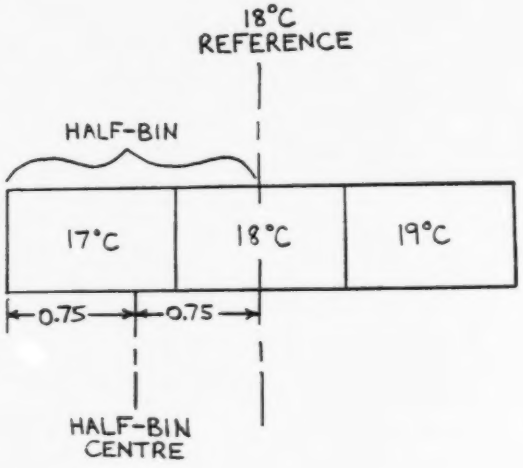
Table 1 gives frequencies of occurrence of dry-bulb temperature for each degree Celsius by month of the year for the period from January 1953 to December 1976, a total of 24 years. Table 2 was derived by dividing each entry in Table 1 by 24 and rounding to the nearest hour giving the average annual hours at each temperature.

Heating Data

A structure's heating requirements are closely related to the length of time that the outside ambient remains below the reference temperature for the structure. Heating requirements are usually reported in degree-hours, grouped by convenient temperature bins. This report makes historical weather data available in Celsius bins for the first time. The bins in Table 3 are 3 Celsius degrees wide showing the dry-bulb temperature frequency in hours per year. Again, Table 1 was used to obtain Table 3 and the results were rounded to the nearest hour.

job	file	date	report no.
740612-571-011	814.34	December 29, 1982	82-397-K

The remaining 7 tables, derived using Table 3, give the "Moment of Temperature"; that is, the number of degree-hours per year below a specified reference temperature. In Table 4, the standard reference temperature of 18°C is used, the remaining reference temperatures are 16°C, 14°C, 12°C, 10°C, 0°C and -10°C. The value of the degree hours in each 3C° bin is obtained by the straight forward multiplication of the hours in that bin (from Table 3) by the temperature difference between the bin centre and the reference temperature (shown in Column 2 of each table). The only exception to this procedure occurs when the bin itself partially overlaps the chosen reference temperature. The computation for such cases can be best illustrated by means of a sketch. In Table 4, the warmest bin with temperatures just below the reference temperature (18°C) is, in fact, the 18°C bin. The 18°C bin itself is made up of temperatures 17°C, 18°C, and 19°C as shown below:



Since only 1/2 the full bin is below the reference temperature, only half the multiplying hours shown in Table 3 are used. This is indicated by the notation "1/2 [18]" on Table 4. Furthermore, the centre of this half-bin is located 0.75C° below the reference temperature. This is shown on Table 4 in column 2 as the appropriate multiplier. Errors due to the linear approximation of weather frequency within the bin are negligible.

Toronto Heating Season

The data in Tables 4 to 10 are plotted on a single graph, Figure 1, to show the impact on heating degree-days for various reference temperatures. Since better insulated and constructed houses tend to have lower and lower reference temperatures, this chart can be used to quickly determine the length and severity of the resulting heating season for such houses. Figure 1 gives the "severity" of each possible heating season by tabulating the area under each reference curve. The degree-days reported in Figure 1 are simply the degree-hour values from Tables 4 to 10 divided by 24.

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TABLE 1

TEMPERATURE DEG(C) FREQUENCY

Hours in Period: 1953-1976

DRY BULB TEMP

Station No 94791 Toronto Int'l A

Deg(C)	Total	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
39													
38										0.8			
37	0.8							3.4	3.4	4.2			
36	11.0							17.8	10.7	5.8			
35	34.3					0.5	4.4	28.8	38.5	10.8			
34	83.0					5.6	25.6	65.1	47.0	19.1			
33	162.4					12.4	56.1	124.8	78.6	30.7			
32	302.6					20.9	95.8	197.8	103.9	52.5			
31	470.9					30.1	162.6	300.7	180.2	59.0			
30	732.6				1.4	38.3	223.3	412.8	309.1	87.1	1.2		
29	1073.2				6.3	47.9	307.5	509.4	425.3	141.3	3.8		
28	1441.5				15.0	93.7	386.6	636.5	547.6	160.0	4.3		
27	1843.7				21.6	108.6	444.3	820.4	705.0	209.8	24.0		
26	2333.7				24.4	155.9	572.0	926.0	828.5	295.0	48.7	1.8	
25	2852.3				33.9	181.2	667.1	1076.7	916.5	397.9	89.1	2.4	
24	3364.8				54.4	262.0	760.7	1223.3	1028.6	530.0	104.2	1.1	
23	3964.3			0.1	61.0	312.2	878.2	1298.8	1210.2	677.3	127.9	3.4	
22	4569.1			3.1	85.5	384.8	994.4	1376.0	1306.6	782.6	191.4	3.6	
21	5128.0			5.0	94.9	498.1	1090.0	1371.8	1408.9	841.4	245.3	5.3	
20	5560.7			9.2	127.5	585.8	1191.1	1327.2	1462.8	1004.0	323.7	20.7	
19	6052.0			16.3	185.5	691.7	1284.9	1258.8	1359.5	1052.6	412.5	28.6	0.4
18	6291.0			19.8	229.0	761.5	1245.9	1088.5	1169.2	1024.9	539.3	41.7	4.1
17	6123.9			29.2	312.9	867.5	1172.6	974.3	1095.4	1052.9	649.2	96.0	3.5
16	6253.5			27.7	343.3	909.2	1088.0	812.6	886.1	1172.0	798.6	156.9	9.6
15	6204.0			42.3	421.3	1012.9	976.8	609.7	742.3	1143.5	872.3	168.3	19.8
14	6009.4	0.2		58.7	495.8	1140.4	886.7	446.6	604.2	1076.1	980.4	258.4	41.5
13	5991.5	2.6	0.1	67.5	550.7	1237.8	760.7	344.0	463.5	956.2	1070.9	317.4	51.6
12	5830.6	2.3	8.0	116.7	721.6	1144.7	601.5	259.3	364.8	887.9	1109.4	467.3	55.6
11	5755.3	11.3	15.2	154.3	841.2	1080.9	448.1	166.3	227.8	807.0	1196.5	584.2	60.1
10	5600.8	16.2	18.2	210.7	885.8	1025.3	363.0	86.3	165.6	666.6	1166.7	746.8	89.6
9	5452.3	23.3	22.6	270.1	1009.7	1079.1	235.0	50.5	89.3	560.4	1215.6	851.9	93.5
8	5514.2	30.7	28.4	319.5	1118.3	943.1	147.7	27.6	43.9	485.8	1142.9	975.9	150.6
7	5452.3	34.8	62.2	375.6	1061.4	826.3	90.5	10.6	14.0	381.2	1023.5	1026.1	233.2
6	5225.8	75.2	108.2	532.6	1158.0	701.1	54.0	1.2	7.2	281.5	976.8	1136.9	352.4
5	5484.6	130.6	152.3	706.7	1188.8	549.3	28.5	2.5	6.9	162.1	828.0	1218.7	534.3
4	5770.6	264.9	279.9	940.5	1128.9	400.5	18.7	0.1	0.9	99.1	715.8	1378.3	682.9
3	6304.8	443.5	495.6	1337.1	1127.9	310.8	12.0		4.4	73.5	638.1	1402.1	1112.3
2	7505.7	749.1	738.4	1690.2	1066.3	202.6	4.1			48.7	454.5	1321.8	1375.1
1	8152.7	944.2	1045.2	1808.2	854.8	112.3	0.8			20.4	314.2	1258.2	1446.3
0	8138.5	1090.5	1232.8										

TABLE 1 (Cont'd)

TEMPERATURE DEG(C) FREQUENCY

Hours in
Period: 1953-1976

DRY BULB TEMP

-Station No 94791 Toronto Int'l A

Deg(C)	Total	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
-1	6729.1	1035.2	1007.8	1412.1	639.1	70.2				7.8	201.1	1027.2	1328.6
-2	5835.7	958.2	1004.0	1202.2	472.9	33.4				4.7	133.2	809.8	1217.3
-3	5117.1	990.7	991.8	1155.3	337.4	12.8				4.6	111.9	616.4	1116.2
-4	4670.2	932.5	939.9	1014.5	229.2	2.9				1.2	57.8	453.1	1039.1
-5	4066.5	958.5	849.4	847.1	139.9	1.8					39.5	279.0	951.3
-6	3627.7	926.5	800.5	770.7	93.4						28.7	193.7	814.2
-7	3302.1	922.6	785.5	609.4	54.9						12.9	141.1	775.7
-8	2997.6	865.3	768.3	497.3	31.0						2.3	94.6	738.8
-9	2753.7	886.1	693.9	391.6	18.7							81.2	682.2
-10	2416.8	815.6	646.7	314.3	12.6							62.1	565.5
-11	2115.4	762.5	582.3	259.8	9.5							25.4	475.9
-12	1913.2	741.7	526.8	208.4	6.2							9.0	421.1
-13	1611.6	658.6	448.7	160.8	2.9							10.2	330.4
-14	1309.4	532.0	410.9	95.3	0.9							2.2	268.1
-15	1115.0	410.4	395.2	86.0	3.4							1.0	219.0
-16	846.5	343.9	313.2	36.6	1.0								151.7
-17	781.1	375.5	249.5	18.1									138.0
-18	593.1	265.4	205.0	18.9									103.8
-19	444.9	212.9	143.6	5.2									83.2
-20	322.7	142.3	115.2	4.2									61.0
-21	216.4	102.7	77.2	4.9									31.6
-22	139.3	75.3	54.7	1.1									8.2
-23	98.9	55.4	29.7	1.0									12.8
-24	55.1	31.8	17.6										5.7
-25	20.8	15.8	4.6										0.4
-26	6.4	4.6	1.8										
-27	6.2	5.4	0.8										
-28	4.6	4.6											
-29	3.2	3.2											
-30	0.8	0.8											
-31	0.6	0.6											
-32													
-33													
-34													
-35													

TABLE 2

TEMPERATURE DEG(C) FREQUENCY

Average Annual Hours — DRY BULB TEMP — Station No 94791 Toronto Int'l A

Deg(C)	Total	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
39													
38													
37													
36													
35	1							1					
34	3							1	2				
33	7						1	3	2	1			
32	12					1	2	5	3	1			
31	19					1	4	8	4	2			
30	31					1	7	13	8	2			
29	45					2	9	17	13	4			
28	60					2	13	21	18	6			
27	78				1	4	16	27	23	7			
26	98				1	5	19	34	29	9	1		
25	119				1	6	24	39	35	12	2		
24	141				1	8	28	45	38	17	4		
23	165				2	11	32	51	43	22	4		
22	190				3	13	37	54	50	28	5		
21	213				4	16	41	57	54	33	8		
20	231				4	21	45	57	59	35	10		
19	251				5	24	50	55	61	42	13	1	
18	263			1	8	29	54	52	57	44	17	1	
17	256			1	10	32	52	45	49	43	22	2	
16	261			1	13	36	49	41	46	44	27	4	
15	258			1	14	38	45	34	37	49	33	7	
14	251			2	18	42	41	25	31	48	36	7	1
13	251			2	21	48	37	19	25	45	41	11	2
12	243			3	23	52	32	14	19	40	45	13	2
11	239		1	5	30	48	25	11	15	37	46	19	2
10	234	1	1	6	35	45	19	7	9	34	50	24	3
9	229	1	1	9	37	43	15	4	7	28	49	31	4
8	229	1	1	11	42	45	10	2	4	23	51	35	4
7	227	1	3	13	47	39	6	1	2	20	48	41	6
6	219	3	5	16	44	34	4		1	16	43	43	10
5	227	5	6	22	48	29	2			12	41	47	15
4	241	11	12	29	50	23	1			7	35	51	22
3	262	18	21	39	47	17	1			4	30	57	28
2	313	31	31	56	47	13	1			3	27	58	46
1	338	39	44	70	44	8				2	19	55	57
0	338	45	51	75	36	5				1	13	52	60

TABLE 2 (Cont'd)

TEMPERATURE DEG(C) FREQUENCY

Average Annual Hours — DRY BULB TEMP — Station No 94791 Toronto Int'l A

Deg(C)	Total	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
-1	280	43	42	59	27	3					8	43	55
-2	244	40	42	50	20	1					6	34	51
-3	223	41	41	48	14	1					5	26	47
-4	194	39	39	42	10						2	19	43
-5	170	40	35	35	6						2	12	40
-6	151	39	33	32	4						1	8	34
-7	137	38	33	25	2						1	6	32
-8	125	36	32	21	1							4	31
-9	114	37	29	16	1							3	28
-10	102	34	27	13	1							3	24
-11	88	32	24	11								1	20
-12	80	31	22	9									18
-13	67	27	19	7									14
-14	54	22	17	4									11
-15	46	17	16	4									9
-16	35	14	13	2									6
-17	33	16	10	1									6
-18	25	11	9	1									4
-19	18	9	6										3
-20	14	6	5										3
-21	8	4	3										1
-22	5	3	2										
-23	4	2	1										1
-24	2	1	1										
-25	1	1											
-26													
-27													
-28													
-29													
-30													
-31													
-32													
-33													
-34													
-35													

TABLE 3

DRY BULB TEMPERATURE DEG(C) FREQUENCY

NUMBER OF HOURS PER YEAR

Month / °C Bin	Total	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec
(39) 38 to 40	0												
(36) 35 to 37	3							1	1	1			
(33) 32 to 34	24					1	4	9	7	3			
(30) 29 to 31	95					4	20	38	25	8			
(27) 26 to 28	233				2	10	47	82	70	21	1		
(24) 23 to 25	424				5	25	83	134	116	51	10		
(21) 20 to 22	637				10	50	123	169	164	96	24	1	
(18) 17 to 19	769			2	23	85	155	153	166	128	53	4	
(15) 14 to 16	770			4	45	116	135	100	114	140	97	17	-
(12) 11 to 13	735	1	1	10	74	147	94	44	60	122	132	44	6
(9) 8 to 10	692	3	3	27	114	133	44	13	20	85	149	91	10
(6) 5 to 7	674	10	13	51	139	103	12	2	3	48	131	131	31
(3) 2 to 4	818	61	63	124	144	53	3		1	14	91	167	97
(0) 1 to -1	959	128	137	205	107	16				3	40	150	173
(-3) -2 to -4	660	120	122	141	43	2					13	78	141
(-6) -5 to -7	459	117	102	93	12						3	26	106
(-9) -8 to -10	341	107	88	50	3							10	83
(-12) -11 to -13	235	90	65	26	1							2	51
(-15) -14 to -16	137	54	47	9									27
(-18) -17 to -19	77	36	25	2									14
(-21) -20 to -22	27	13	10										4
(-24) -23 to -25	7	4	2										1
(-27) -26 to -28	1	1											
(-30) -29 to -31	0												
(-33) -32 to -34	0												
Monthly Total	8777	745	678	744	722	745	720	745	747	720	744	722	745

TABLE 4

MONTHLY MOMENT OF TEMPERATURE

NUMBER OF DEGREE-HOURS BELOW 18°C PER YEAR

Bin Centre Temperature (°C)	Difference Between Bin Centre & 18°C (C°)	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Total
-33	51													0
-30	48													0
-27	45					45								45
-24	42				42	168	84							294
-21	39				156	507	390							1053
-18	36				504	1296	900	72						2772
-15	33				891	1782	1551	297						4521
-12	30			60	1530	2700	1950	780	30					7050
-9	27			270	2241	2889	2376	1350	81					9207
-6	24		72	624	2544	2808	2448	2232	288					11016
-3	21		273	1638	2961	2520	2562	2961	903	42				13860
0	18	54	720	2700	3114	2304	2466	3690	1926	288				17262
3	15	210	1365	2505	1455	915	945	1860	2160	795	45		15	12270
6	12	576	1572	1572	372	120	156	612	1668	1236	144	24	36	8088
9	9	765	1341	819	90	27	27	243	1026	1197	396	117	180	6228
12	6	732	792	264	36	6	6	60	444	882	564	264	360	4410
15	3	420	291	54	3			12	135	348	405	300	342	2310
1/2 [18]	0.75	48	20	2				1	9	32	58	57	62	289
	Monthly Total	2805	6446	10508	15939	18087	15861	14170	8670	4820	1612	762	995	100675

TABLE 5

MONTHLY MOMENT OF TEMPERATURE

NUMBER OF DEGREE-HOURS BELOW 16°C PER YEAR

Bin Centre Temperature (°C)	Difference Between Bin Centre & 16°C (C°)	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Total
-33	49													0
-30	46													0
-27	43					43								43
-24	40				40	160	80							280
-21	37				148	481	370							999
-18	34				476	1224	850	68						2618
-15	31				817	1674	1457	279						4247
-12	28			56	1428	2520	1820	728	28					6580
-9	25			250	2075	2675	2200	1250	75					8525
-6	22		66	572	2332	2574	2244	2046	264					10098
-3	19		247	1482	2679	2280	2318	2679	817	38				12540
0	16	48	640	2400	2768	2048	2192	3280	1712	256				15344
3	13	182	1183	2171	1261	793	819	1612	1872	689	39		13	10634
6	10	480	1310	1310	310	100	130	510	1390	1030	120	20	30	6740
9	7	595	1043	637	70	21	21	189	798	931	308	91	140	4844
12	4	488	528	176	24	4	4	40	296	588	376	176	240	2940
5/6 [15]	1.25	146	101	19	1			4	47	121	141	104	119	803
	Monthly Total	1939	5118	9073	14449	16597	14505	12685	7299	3653	984	391	542	87235

TABLE 6

MONTHLY MOMENT OF TEMPERATURE

NUMBER OF DEGREE-HOURS BELOW 14°C PER YEAR

Bin Centre Temperature (°C)	Difference Between Bin Centre & 14°C (C°)	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Total
-33	47													0
-30	44													0
-27	41					41								41
-24	38				38	152	76							266
-21	35				140	455	350							945
-18	32				448	1152	800	64						2464
-15	29				783	1566	1363	261						3973
-12	26			52	1326	2340	1690	676	26					6110
-9	23			230	1909	2461	2024	1150	69					7843
-6	20		60	520	2120	2340	2040	1860	240					9180
-3	17		221	1326	2397	2040	2074	2397	731	34				11220
0	14	42	560	2100	2422	1792	1918	2870	1498	224				13426
3	11	154	1001	1837	1067	671	693	1364	1584	583	33		11	8998
6	8	384	1048	1048	248	80	104	408	1112	824	96	16	24	5392
9	5	425	745	455	50	15	15	135	570	665	220	65	100	3460
12	2	244	264	88	12	2	2	20	148	294	188	88	120	1470
1/6 [15]	0.25	6	4	1					2	5	6	4	5	33
	Monthly Total	1255	3903	7657	12960	15107	13149	11205	5980	2629	543	173	260	74821

TABLE 1

MONTHLY MOMENT OF TEMPERATURE

NUMBER OF DEGREE-HOURS BELOW 12°C PER YEAR

Bin Centre Temperature (°C)	Difference Between Bin Centre & 12°C(C°)	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Total
-33	45													0
-30	42													0
-27	39					39								39
-24	36				36	144	72							252
-21	33				132	429	330							891
-18	30				420	1080	750	60						2310
-15	27				729	1458	1269	243						3699
-12	24			48	1224	2160	1560	624	24					5640
-9	21			210	1743	2247	1848	1050	63					7161
-6	18		54	468	1908	2106	1836	1674	216					8262
-3	15		195	1170	2115	1800	1830	2115	645	30				9900
0	12	36	480	1800	2076	1536	1644	2460	1284	192				11508
3	9	126	819	1503	873	549	567	1116	1296	477	27		9	7362
6	6	288	786	786	186	60	78	306	834	618	72	12	18	4044
9	3	255	447	273	30	9	9	81	342	399	132	39	60	2076
1/2 [12]	0.75	46	50	17	2			4	28	55	35	17	23	277
	Monthly Total	751	2831	6275	11474	13617	11793	9733	4732	1771	266	69	110	63421

TABLE 8

MONTHLY MOMENT OF TEMPERATURE

NUMBER OF DEGREE-HOURS BELOW 10°C PER YEAR

Bin Centre Temperature (°C)	Difference Between Bin Centre & 10°C (C°)	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Total
-33	43													0
-30	40													0
-27	37					37								37
-24	34				34	136	68							238
-21	31				124	403	310							837
-18	28				392	1008	700	56						2156
-15	25				675	1350	1175	225						3425
-12	22			44	1122	1980	1430	572	22					5170
-9	19			190	1577	2033	1672	950	57					6479
-6	16		48	416	1696	1872	1632	1488	192					7344
-3	13		169	1014	1833	1560	1586	1833	559	26				8580
0	10	30	400	1500	1730	1280	1370	2050	1070	160				9590
3	7	98	637	1169	679	427	441	868	1008	371	21		7	5726
6	4	192	524	524	124	40	52	204	556	412	48	8	12	2696
5/6 [9]	1.25	89	155	95	10	3	3	28	119	139	46	14	21	722
	Monthly Total	409	1933	4952	9996	12129	10439	8274	3583	1108	115	22	40	53000

TABLE 9

MONTHLY MOMENT OF TEMPERATURE

NUMBER OF DEGREE-HOURS BELOW 0°C PER YEAR

Bin Centre Temperature (°C)	Difference Between Bin Centre & 0°C (C°)	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Total
-33	33													0
-30	30													0
-27	27					27								27
-24	24				24	96	48							168
-21	21				84	273	210							567
-18	18				252	648	450	36						1386
-15	15				405	810	705	135						2055
-12	12			24	612	1080	780	312	12					2820
-9	9			90	747	963	792	450	27					3069
-6	6		18	156	636	702	612	558	72					2754
-3	3		39	234	423	360	366	423	129	6				1980
1/2 [0]	0.75	1	15	56	65	48	51	77	40	6				359
	Monthly Total	1	72	560	3248	5007	4014	1991	280	12	0	0	0	15185

TABLE 10

MONTHLY MOMENT OF TEMPERATURE

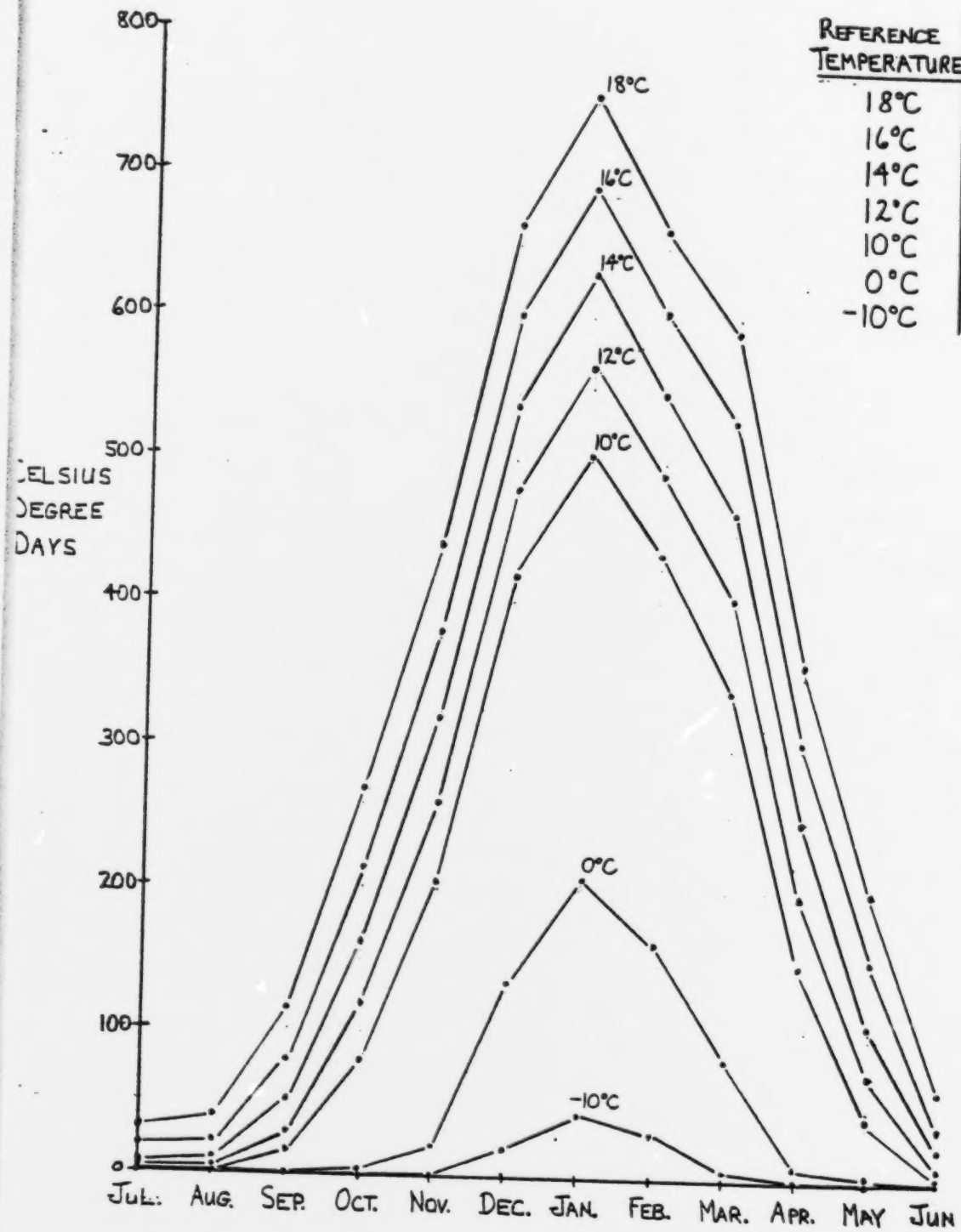
NUMBER OF DEGREE-HOURS BELOW -10°C PER YEAR

Bin Centre Temperature (°C)	Difference Between Bin Centre & -10°C (C°)	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Total
-33	23													0
-30	20					17								0
-27	17				14	56	28							17
-24	14				44	143	110							98
-21	11				112	288	200	16						297
-18	8				135	270	235	45						616
-15	5			4	102	180	130	52	2					685
-12	2			10	86	111	92	52	3					470
5/6 [-9]	1.25													354
	Monthly Total	0	0	14	493	1065	795	165	5	0	0	0	0	2537

FIGURE #1

TORONTO HEATING SEASON DEGREE DAYS
FOR VARIOUS REFERENCE TEMPERATURES

REFERENCE TEMPERATURE	TOTAL YEAR DEGREE DAYS
18°C	4195
16°C	3635
14°C	3118
12°C	2643
10°C	2208
0°C	633
-10°C	106



APPENDIX

RECONSTRUCTION OF CELSIUS BINS FROM FAHRENHEIT BINS USING LINEAR INTERPOLATION

Let N_i be the number of hours at temperature i°F, ie between (i-0.5)°F and (i+0.5)°F during the period of the data from January 1953 to December 1976 (HDS-3R). We require the corresponding M_j for j°C±0.5°C. Begin for simplicity and specificity at $i \varepsilon j = \frac{5}{9}(i-32)$ is an integer, eg i=68°F, j=20°C.

Then,

$$M_j = 0.405\ N_{i-1} + 0.99\ N_i + 0.405\ N_{i+1}$$

$$M_{j+1} = 0.005\ N_i + 0.595\ N_{i+1} + 0.955\ N_{i+2} + 0.245\ N_{i+3}$$

$$M_{j+2} = 0.045\ N_{i+2} + 0.755\ N_{i+3} + 0.875\ N_{i+4} + 0.125\ N_{i+5}$$

$$M_{j+3} = 0.125\ N_{i+4} + 0.875\ N_{i+5} + 0.755\ N_{i+6} + 0.045\ N_{i+7}$$

$$M_{j+4} = 0.245\ N_{i+6} + 0.955\ N_{i+7} + 0.595\ N_{i+8} + 0.005\ N_{i+9}$$

$$M_{j+5} = 0.405\ N_{i+8} + 0.99\ N_{i+9} + 0.405\ N_{i+10} = M_j \quad (i=i+9)$$

etc

W.R. Jones
82.05.14

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Subject Toronto Weather Data

The accompanying report, by Frank Porfido, tabulates Toronto weather data in 3° Celsius bins for the first time. In addition, heating season "Degree Day" information is given for seven different heating reference temperatures, rather than the usual single value of 18°C. This will be useful when evaluating the heating season severity for many modern houses which have no heating requirement during mild weather.

Figure 1 is of particular interest since it shows graphically how the heating season "shrinks" when lower reference temperatures are used. For instance, a super-insulated house with a 0°C reference temperature would require only 15% of the heating energy of a similar "standard" house. However, the peak load of such a super-insulated house would be about half that of the standard one, assuming a design temperature of -18°C.

Such information has implications for the capacity and energy requirements for new types of heating systems for well-insulated structures of the future.

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Attach

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